

# **Laid Open Document**

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Applicant : EM-Technik GmbH Armaturenbau

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## **Screwed pipe connection for relatively rigid hoses**

The present invention relates to a screwed pipe connection for affixing substantially rigid hoses preferably in handling systems, comprising a union body with an insert aperture for the hose and a sealing bush to be pushed onto the hose and a union nut to be screwed onto the union body, wherein the union body conically expands in the hose receiver and the sealing bush is provided with a counter-cone. A retaining washer is disposed between the union nut and the sealing insert. In a state pushed onto the hose the retaining washer is adapted to be inclined against the direction of withdrawal of the hose and, if necessary, has a dimension smaller than that of the hose so that, when the hose is pulled, the washer cuts into the material of the hose.

## **DESCRIPTION**

The present invention relates to a screwed pipe connection for relatively rigid hoses, especially on handling systems. Such handling systems are, for example, employed for the construction of motor vehicles and serve to bring out liquids, such as colors in spraying systems. As said handling systems are movable, the problem of affixing relatively rigid hoses, e.g. made of polytetrafluor ethylene (PTFE), resides in that strong lengthwise forces occur due to moving the handling system back and forth, which pull the hose out of the screwed connection, which does not happen with non-rigid hoses owing to their flexibility.

Therefore, it is the object of the present invention to provide a screwed connection by means of which especially relatively rigid hoses can be secured against being pulled out from the screwed connection.

This object is achieved with a screwed connection for affixing substantially rigid hoses preferably in handling systems, comprising a union body with an insert aperture for the hose and a sealing bush to be pushed onto the hose and a union nut to be screwed onto the union body, wherein the union body conically expands in the hose receiver and the sealing bush is provided with a counter-cone, wherein, according to the invention, a retaining washer is disposed between the union nut and the sealing insert. In a state pushed onto the hose the retaining washer is adapted to be inclined and has a dimension smaller than that of the hose so that, when the hose is withdrawn, the washer cuts into the material of the hose.

The function of the screwed connection is as follows:

The retaining ring is pushed onto the hose and, due to the smaller dimension of its central aperture, is deformed in a slightly conically inclined manner, or the retaining ring may also be conically preformed, respectively. The ring is adjacent the upper collar of the sealing insert and, when the union nut is screwed on, is clamped between the upper portion of the latter and the upper edge of the sealing insert, wherein, simultaneously when screwing on the union nut, the conical portion of the sealing insert is sealingly pressed against the outer casing of the hose due to the counter-cone of the union body.

Due to the inclined position of the conical, i.e. on an average angularly inclined toward the center, retaining ring and the fixation between the union nut and the sealing insert against the pulling direction of the hose the retaining ring cuts into the hose when the same is subjected to tensile forces and secures the hose against the withdrawal thereof to a surprising large extent.

In order to maintain the inclined form of the flanks of the retaining washer against the central aperture, which serves to push through the hose, during the assembly, it is further proposed to construct the sealing bush such that its upper edge is adjacent the retaining washer in the peripheral portion thereof, by omitting a space to the hose, wherein the retaining washer is only peripherally supported between the upper edge of the sealing insert and the inner collar of the union nut and, inwardly toward

the hose, a portion remaining free for the elastic deformation of the retaining washer remains.

Moreover, the resistance against the withdrawal of the hose can additionally be increased by providing a socket in the middle of the union body onto which the hose is pushed. The wedge-shaped or, respectively, conical end of the sealing insert presses the hose against the socket when the union nut is screwed over the counter-cone of the union body. To further increase the resistance against withdrawal the socket may also be profiled, e.g. with a Christmas tree toothing.

Finally, it is proposed to provide the retaining washer with inwardly directed teeth so as to facilitate the handling ability.

The present invention is explained in more detail by means of the enclosed figures, wherein

- Fig. 1        shows the entire screwed connection,
- Fig. 2        shows an enlarged detail,
- Fig. 3        shows a retaining washer.

The screwed connection is formed of a union body 1 with a hexagon insert bit 8 and an external thread piece 9 to be screwed into a liquid or gas conducting armature such as a so-called handling system. Another external thread piece 10 is provided on the opposite side onto which the union nut 4 is screwed. The union body 1 comprises a channel 11 into which is inserted from above the hose 5 via the optionally provided socket 8. The union body comprises a conical expansion 12 into which the likewise conically designed sealing insert 2 engages or, respectively, is pressed in by the union nut, with the hose 5 being clamped. The sealing insert 2 comprises a recess 13 (fig. 2) expanding at the top, with an upper edge 6. The retaining washer 3 is retained in a clamped position between said edge 6 and the collar 14 of the union nut.

Fig. 2 shows in an enlarged view said retaining washer 3 between said collar 14 of said union nut 4 and said upper edge 6 of said sealing insert 2, which not only fixes

the hose 5, but simultaneously seals the same towards the outside in a manner known per se.

As can be seen, the retaining washer is inclined in an inwardly sloping manner and comprises at its deeper inner edge 15 hose 5. The inclination of the retaining washer 3 may be preformed, it may, however, also be formed by pushing it onto the relatively rigid and thick-walled (PTFE) hose, as the washer 3 has a dimension smaller than that of the hose casing. If the hose is subjected to tensile forces, the lower inner edge of the washer according to the illustration is lifted up by reducing the inner diameter, cuts into the casing of the hose 5 and secures the same against withdrawal. Advantageous is thereby the free space 7 between the hose 5 and the sealing insert 2, so that the retaining washer freely projects over the edge 6 of the sealing insert towards the inside.

Fig. 3 shows a front view of a retaining washer and Fig. 3a shows a top view thereof. The washer comprises inwardly directed teeth 16 and is inclined by an angle  $\alpha$ . In contrast to a basically possible non-toothed washer 3, this one is easier to push onto the hose since it need not have a smaller dimension in the unscrewed state and can comfortably be positioned in the union body or on the socket thereof, respectively, once the hose has been pushed in. The interspaces 17 between the teeth increase the elasticity of the washer so that the smaller dimension with respect to the casing of the hose can be obtained by clamping the washer between the sealing insert and the union nut, with the angle  $\alpha$  being reduced and the teeth 16 being pressed into the material of the hose. In addition, the teeth 16 can also be provided with a cutting flank 18.

## List of Reference Numerals

- 1 union body
- 2 sealing insert
- 3 retaining washer
- 4 union nut
- 5 hose
- 6 edge
- 7 free space
- 8 socket
- 9 external thread piece
- 10 external thread piece
- 11 channel
- 12 expansion
- 13 recess
- 14 collar
- 15 inner edge of washer
- 16 teeth
- 17 tooth spaces
- 18 cutting flank

## PATENT CLAIMS:

1. Screwed connection for affixing substantially rigid hoses preferably in handling systems, comprising a union body with an insert aperture for the hose and a sealing bush to be pushed onto the hose and a union nut to be screwed onto the union body, wherein the union body conically expands in the hose receiver and the sealing bush is provided with a counter-cone, **characterized in that** a retaining washer (3) is disposed between the union nut (4) and the sealing insert (2), wherein, in a state pushed onto the hose, the retaining washer (3) is adapted to be inclined against the direction of withdrawal of the hose and, if necessary, has a dimension smaller than that of the hose (5) so that, when the hose (5) is pulled, the washer (3) cuts into the material of the hose.
2. Screwed connection according to claim 1, characterized in that the sealing bush (2) is formed such that its upper edge (6) is adjacent the retaining washer (3) in the peripheral portion thereof, by omitting a space (7) to the hose (5).
3. Screwed connection according to claim 1 or 2, characterized in that the union body (1) comprises a socket (8) onto which the hose can be pushed.
4. Screwed connection according to one of claims 1 to 3, characterized in that the retaining washer (3) comprises inwardly directed teeth (16).